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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/395,490	09/14/1999	ROBERT EVEREST JOHNSON	LUT-2-0023	6096

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EXAMINER

BURD, KEVIN MICHAEL

ART UNIT	PAPER NUMBER
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2631

DATE MAILED: 03/10/2004

15

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/395,490

Applicant(s)

JOHNSON ET AL.

Examiner

Kevin M Burd

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7-13, 15-25, 27-28 and 30-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-13, 15-25, 27, 28 and 30-34 is/are rejected.
- 7) ☒ Claim(s) 6, 14 and 26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>11, 13</u> . | 6) <input type="checkbox"/> Other: _____ |

1. This office action, in response to the amendment filed 1/12/2004, is a final office action.

Response to Arguments

2. Applicant's arguments filed 1/12/2004 have been fully considered but they are not persuasive.

Regarding the discussion of claims 16, 27 and 28, Applicant states Leyendecker does not fairly disclose a receiver that samples an RF signal. The examiner disagrees. Figure 4 shows components that receives the RF signal and then samples that signal. The analog down converter 423 receives the RF output signal and the ADC 424 samples the RF signal and forwards the sampled signal to other components of the receiver, specifically elements 425, 429 and 431. For this reason and the reasons stated in the previous office action, the rejections of the claims are maintained and stated below.

Regarding the discussion of claims 17, 21, 30 and 34, Applicant states Jones does not disclose a system that includes a receiver operative to obtain samples of the output RF signals. The Examiner disagrees. Figure 2 shows components that receive the output RF signal and then samples the received signal. The analog down converter 123 receives the output RF signal and A/D 124 samples the received RF signal. The sampled signal is forwarded to additional elements of the receiver for further processing

including elements 125, 229 and 131. The examiner has addressed the previous issues in the previous office action.

Regarding the discussion of claims 1-3, 8-12, 15, 16, 18, 19, 22-24, 27-29, 31 and 32, Applicant states Perkins does not cure the deficiencies of Jones as noted in the response dated 1/12/2004. The examiner has addressed these issues above. In addition, Applicant states Jones does not identify a particular pre-distortion method. The examiner disagrees. As pointed out in the previous office action, the combination of Jones and Perkins discloses the method and apparatus of predistorting a base band signal as stated in the previous office action in paragraph 9 and stated below. It is unclear to the examiner how the combination does not identify a specific pre-distortion method. The steps and components are disclosed in these rejections. Applicant also states previously argued that the resultant combination would not render the claims obvious. Applicant previously stated there is no motivation to combine the teachings of Jones and Perkins. The examiner disagrees. Jones discloses predistorting a signal. Perkins discloses using a method of clipping signals in a predistorter to reduce power consumption prior to transmission. Using a look up table memory technique helps to achieve this lower power consumption. By using the teachings of Perkins in the system of Jones, less power will be consumed. Applicant states Perkins does not show predistortion feedback. This is correct. However, Jones does disclose the feedback so the combination of Jones and Perkins discloses the feedback. Applicant states Jones has no need for a clipping to be accomplished since Jones teaches a way of attenuating a signal prior to being input to the digital to analog converter. The teachings of Perkins

are necessary to provide the proper predistortion so that the predistorter correctly compensates for the distortion caused in the power amplifier 115 of Jones (Jones: column 6, lines 31-47).

Regarding the discussion of claims 4, 5, 7, 13, 20, 25 and 33, the rejections of these claims are maintained for the reasons stated above.

For these reasons and the reasons stated previously, the rejections of the claims are maintained and stated below.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under treaty defined in section 351 (a) shall have the effects for the purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 16, 27 and 28 are rejected under 35 U.S.C. 102(e) as being anticipated by Leyendecker et al (US 5,923,712).

Regarding claims 16, 27 and 28, Leyendecker discloses an apparatus and method for adaptively predistorting a baseband signal (figure 4). The predistorter 407 predistorts the received in-phase and quadrature component signals to compensate for the distortion of the power amplifier 103. The predistorted 800 ksps component signals from the predistorter 407 are received by the digital interpolator 409 (column 7, line 50

to column 8, line 5). The signals are upsampled in the digital interpolator to increase the sampling (column 7, lines 56-58). The interpolator filters the upsampled base band signal (column 8, lines 2-4). The output of the interpolator is a predistorted upsampled signal which is converted to RF signal for transmission. Leyendecker further discloses using the input I and Q signal to retrieve information from a look-up table (column 10, lines 35-58 and figure 6). The output signal is based on the information from the look-up table since the look-up table determines the predistortion that takes place. A receiver retrieves samples of the RF signals and feeds these signals to the trainer 431 (figure 4). The trainer provides input signal to the look-up table (figure 6).

4. Claims 17, 21, 30 and 34 are rejected under 35 U.S.C. 102(e) as being anticipated by Jones et al (US 5,920,808).

Regarding claims 17, 21, 30 and 34, Jones discloses an apparatus and method for adaptively predistorting a baseband signal (figure 2). The predistorter 107 predistorts the received in-phase and quadrature component signals to compensate for the distortion of the power amplifier 115. The predistorted 800 ksps component signals from the predistorter 107 are received by the digital interpolator 209 (column 7, lines 22-29). The signals are upsampled in the digital interpolator to increase the sampling (column 7, lines 28-42). The interpolator filters the upsampled base band signal (column 7, lines 42-43). The output of the interpolator is a predistorted upsampled signal which is converted to RF signal for transmission. A receiver retrieves samples of the RF signals and feeds these signals to the trainer 131 (figure 2).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-3, 8-12, 15, 18, 19, 22-24, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US 5,920,808) in view of Perkins et al (US 5,963,549).

Regarding claim 1, 9, 12, 18, 19, 22, 24, 31 and 32, Jones discloses an apparatus and method for adaptively predistorting a baseband signal (figure 2). The predistorter 107 predistorts the received in-phase and quadrature component signals to compensate for the distortion of the power amplifier 115. The predistorted 800 kbps component signals from the predistorter 107 are received by the digital interpolator 209 (column 7, lines 22-29). The signals are upsampled in the digital interpolator to increase the sampling (column 7, lines 28-42). The interpolator filters the upsampled base band signal (column 7, lines 42-43). Filtering the signals eliminates high frequency harmonics in the system (column 4, lines 35-47). The output of the interpolator is a predistorted upsampled signal which is converted to RF signal for transmission. A receiver retrieves samples of the RF signals and feeds these signals to the trainer 131 (figure 2). Jones does not disclose clipping the signal in the predistorter. Perkins discloses it is well known

to clip signals in a predistortion unit to reduce power requirements prior to transmission. Using a lookup table memory technique, helps achieve this lower power consumption (column 2, lines 30-44). It would have been obvious for one of ordinary skill in the art at the time of the invention to use the predistortion unit of Perkins to clip a baseband signal using a look up memory technique for the reason stated above.

Regarding claims 2 and 10, Jones discloses upconverting the 800 ksps signals to 3.2 Msps signal (column 7, lines 30-45).

Regarding claims 3, 11 and 23, Perkins discloses the I and Q components are summed prior to recovering lookup table information (column 2, lines 30-44).

Regarding claims 8 and 15, the signal is delayed by elements 112, 113 and 115 prior to being output of the system (Jones figure 2).

6. Claims 4, 5, 7, 13, 20, 25 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US 5,920,808) in view of Perkins et al (US 5,963,549) as applied to claims 1-3, 8-12, 15, 16, 18, 19, 22-24, 27-29, 31 and 32 above, and further in view of Miyashita (US 6,288,610).

Regarding claims 4, 5, 7, 13, 20, 25 and 33, the combination of Jones and Perkins disclose an apparatus and method for adaptively predistorting a baseband signal as stated above. The combination does not disclose using the lookup table technique to predistort the baseband signal where the distortion characteristics are defined by polynomial equations having coefficients. Miyashita discloses the predistortion characteristics are defined by the polynomial equation shown in column 4,

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lines 60-68. The equation $g(x)$ is the expression of the envelope transfer function. It would have been obvious to incorporate the method of using a polynomial equation from a look up table to predistort a baseband signal as disclosed in Miyashita into the combination to correct distortion impairing linearity which occurs in the amplifier (column 3, lines 31-33).

Allowable Subject Matter

7. Claims 6, 14 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Contact Information

Any response to this final action should be mailed to:

Box AF

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 872-9314, (for formal communications; please mark
"EXPEDITED PROCEDURE" or for informal or draft
communications, please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive,
Arlington, VA. Sixth Floor (Receptionist).

Any inquiry concerning this communication or earlier communications from the
examiner should be directed to Kevin Burd, whose telephone number is (703) 308-
7034. The Examiner can normally be reached on Monday-Thursday from 9:00 AM -
6:00 PM.

Any inquiry of a general nature or relating to the status of this application should be
directed to the Group receptionist whose telephone number is (703) 305-3800.



Kevin M. Burd
PATENT EXAMINER
3/5/2004



KHAI TRAN
PATENT EXAMINER